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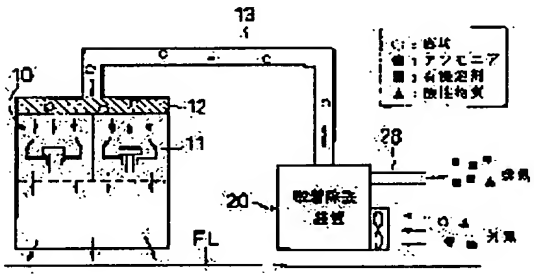
(54) SUBSTRATE-PROCESSING APPARATUS

(57)Abstract:
PROBLEM TO BE SOLVED: To provide a substrate-processing apparatus which can lower the running cost of the device by effectively removing contaminant substances in the surrounding.
SOLUTION: A processing device body 10 is connected to an adsorptive removing device 20 via a cleaned air flow passage 13. The adsorptive removing device 20 is equipped with an adsorption member, which adsorbs chemical contaminant substances in the outside air and is recycled by processing such as heating. Cleaning processing using part of the adsorption member and the recycling processing of other parts by the adsorption member are carried out in parallel. Cleaned air obtained by the adsorptive removing device 20 is supplied to a substrate-processing part 11 via a dust removing filter 12. The adsorption member is recycled and used, so that the running cost of the device is can be reduced.



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CLAIMS

[Claim(s)]
[Claim 1] The substrate processor characterized by to have the adsorption-treatment equipment which incorporates non-clarification air and adsorbs the chemical pollutant in non-clarification air in the substrate processor equipped with a means to by_which a cleanliness class supplies ten or less defecation air to the substrate processing section, the defecation air distribution channel which lead the air defecated from adsorption-treatment equipment to the substrate processing section, and the exhaust-air path which discharge the pollutant which seceded from adsorption-treatment equipment.
[Claim 2] In a substrate processor according to claim 1 adsorption treatment equipment The refreshable adsorption member which secedes from the pollutant to which it stuck by regeneration while adsorbing a chemical pollutant, The substrate processor characterized by having the displacement means which carries out a variation rate covering the regeneration location made to secede from the pollutant which adsorbed this adsorption member with the defecation processing location which defecates non-clarification air, and a regeneration means to make it secede from the adsorption member in a regeneration location to a pollutant.
[Claim 3] It is the substrate processor to which the rotation variation rate of the adsorption member is carried out as other parts of an adsorption member are located in a regeneration location when a displacement means has a part of adsorption member in a defecation processing location in a substrate processor according to claim 2.
[Claim 4] It is the substrate processor to which the straight-line variation rate of the adsorption member is carried out as other parts of an adsorption member are located in a regeneration location when a displacement means has a part of adsorption member in a defecation processing location in a substrate processor according to claim 2.
[Claim 5] It is the substrate processor which makes a pollutant secede from an adsorption member by heating the adsorption member which a regeneration means has in a regeneration location in a substrate processor according to claim 2 to 4.
[Claim 6] It is the substrate processor equipped with a cooling means to make a cooling processing location carry out the variation rate of the adsorption member, and to cool an adsorption member in this cooling processing location as the displacement means carried out the variation rate of the adsorption member from the regeneration location to the defecation processing location in the substrate processor according to claim 5.
[Claim 7] The substrate processor which equipped the defecation air distribution channel from an adsorption member to the substrate processing section with the dust removal filter from which dust is removed in the substrate processor according to claim 2 to 6.

[Claim 8] The substrate processor equipped with the chemisorption filter which carries out adsorption treatment of the chemical pollutant to the defecation air distribution channel from an adsorption member to the substrate processing section in a substrate processor according to claim 2 to 7.
[Claim 9] The substrate processor equipped with the temperature-and-humidity controller which adjusts the temperature and humidity of defecation air to the defecation air distribution channel from an adsorption member to the substrate processing section in a substrate processor according to claim 2 to 8.
[Claim 10] The substrate processor equipped with the circulation path which collects the air which circulated the substrate processing section in a substrate processor according to claim 2 to 9, and returns this air to a defecation processing location.
[Claim 11] The substrate processor which made free passage connection of the open air incorporation path of incorporating the open air in a substrate processor according to claim 10 for the circulation path which hits the superior side of a defecation processing location.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the equipment which carries out spreading formation of the photoresist film at substrates, such as a semi-conductor wafer and a glass substrate for liquid crystal displays, or the substrate processor which performs exposure, development, drug solution processing, washing processing, etc. at the substrate with which the photoresist film was formed, and relates to the technique for removing the pollutant in a perimeter environment in this kind of substrate processor especially.
[0002]
[Description of the Prior Art] In the spin coater which carries out rotation spreading of the photoresist agent, use of a chemistry magnification mold resist is becoming in use with the more and more detailed-izing of a circuit pattern at the photolithography process which forms a detailed circuit pattern in substrates, such as a semi-conductor wafer, for example, a substrate. It is known that formation of the detailed circuit for which a chemical reaction process is checked and a chemistry magnification mold photoresist is needed when chemicals, such as ammonia, exist in a perimeter environment will become difficult. Moreover, recently, receiving a bad influence with matter other than ammonia which exists in a perimeter environment, for example, NMP (N-methyl pyrrolidone), the acid, etc., is also checked. Therefore, it is being greatly concerned with improvement in the degree of integration of a semiconductor device, or productivity how the spin coater mentioned above and the contaminant which exists in a perimeter environment in the substrate processor which performs various processings to the substrate with which the photoresist film was formed in addition to this are removed, and a pure environment is made.

[0003] in order to respond to the request of make a perimeter environment into clarification as much as possible, the ventilation path of the air supply as a downflow from the upper part of a substrate processor equip with "the chemisorption filter which the acid be make to adhere to a front face and removed alkaline substances, such as ammonia,", and "the charcoal filter from which not only ammonia etc. but the organic substance which exist in atmospheric air be removable", and recently it be made the air supply to the interior of equipment make into clarification.
[0004]
[Problem(s) to be Solved by the Invention] However, in the case of the conventional example which has such a configuration, there are the following problems. namely, filters mentioned above, such as a chemisorption filter and a charcoal filter, -- very much -- expensive -- moreover these filters only save up a surrounding pollutant theoretically -- being the so-called -- "-- by saving up, since it is formula", a life is short and will usually have only about one year. Therefore, a filter needs to be exchanged periodical and it has become the cause to which the running cost of equipment is made to increase.
[0005] Moreover, the ammonia concentration in a clean room etc. may turn into high concentration unusually temporarily under the effect of fertilizer spraying of the cultivated land region which exists in a perimeter according to the site condition of semiconductor production works etc. If it becomes such a situation, it becomes impossible to fully filter the pollutant in atmospheric air even to the concentration for which it asks only with a chemisorption filter, and a defect will occur suddenly for a product. It is also the same as when the drug solution which does a bad influence in a clean room is spilt or gas is made to reveal. As for these situations, un-arranging [of contracting remarkably] also causes the life of a chemisorption filter.
[0006] Furthermore, in a spin coater, in order to secure the spreading homogeneity, a temperature control or the thing which is carrying out humidity control is common in the processing section. In order to reduce the running cost of such an air-conditioning means, recently, the technique of collecting the air currents discharged from the inside of equipment, and circulating through and using them may be taken. It is that becoming a problem with the air-conditioning means of such a circuit system sticks to the filters by which the organic solvent ambient atmosphere generated inside equipment invaded into the circulation path so much, and was attached in equipment. If an organic substance sticks to a filter, a filter will not be able to demonstrate the original engine performance but a life will become remarkably short. Although there is also a means which carries out the recovery exhaust air of the organic solvent ambient atmosphere generated from an equipment side, it is difficult to exhaust all organic solvent ambient atmospheres, and since receiving a bad influence depending on a filter kind is checked even if it is a low-concentration organic solvent ambient atmosphere, it is very difficult [it] to take the high cure of effectiveness.
[0007] This invention sets it as the main purpose to offer the substrate processor which can be made in view of such a situation, can remove the pollutant in a perimeter environment effectively, and can reduce the running cost of equipment. Moreover, other purposes of this invention are to offer the substrate processor which does not receive a bad influence, even if the concentration of the pollutant in a perimeter environment rises suddenly. Furthermore, this invention aims at removing effectively the organic solvent ambient atmosphere generated from an equipment side in the substrate processor equipped with the air-conditioning means of a circuit system.
[0008]
[Means for Solving the Problem] This invention takes the following configurations, in order to attain such a purpose. Namely, invention according to claim 1 is set to the substrate processor equipped with a means by which a cleanliness class supplies ten or less defecation air to the substrate processing section. It is characterized by having the adsorption treatment equipment which incorporates non-clarification air and adsorbs the chemical pollutant in non-clarification air, the defecation air distribution channel which leads the air defecated from adsorption treatment equipment to the substrate processing section, and the exhaust air path which discharges the pollutant which seceded from adsorption treatment equipment.

[0009] Invention according to claim 2 is set to a substrate processor according to claim 1. Adsorption treatment equipment The refreshable adsorption member which secedes from the pollutant to which it stuck by regeneration while adsorbing a chemical pollutant, It has the displacement means which carries out a variation rate covering the regeneration location made to secede from the pollutant which adsorbed this adsorption member with the defecation processing location which defecates non-clarification air, and a regeneration means to make it secede from the adsorption member in a regeneration location to a pollutant.
[0010] In a substrate processor according to claim 2, when a displacement means has a part of adsorption member in a defecation processing location, invention according to claim 3 carries out the rotation variation rate of the adsorption member, as other parts of an adsorption member are located in a regeneration location.
[0011] In a substrate processor according to claim 2, when a displacement means has a part of adsorption member in a defecation processing location, invention according to claim 4 carries out the straight-line variation rate of the adsorption member, as other parts of an adsorption member are located in a regeneration location.
[0012] A regeneration means makes a pollutant secede [invention / according to claim 5] from an adsorption member by heating the adsorption member in a regeneration location in a substrate processor according to claim 2 to 4.
[0013] A displacement means is equipped with a cooling means by which it makes a cooling processing location carry out the variation rate of the adsorption member, and cools an adsorption member in this cooling processing location as invention according to claim 6 carries out the variation rate of the adsorption member from a regeneration location to a defecation processing location in a substrate processor according to claim 5.
[0014] Invention according to claim 7 equips the defecation air distribution channel from an adsorption member to the substrate processing section with the dust removal filter from which dust is removed in a substrate processor according to claim 2 to 6.
[0015] Invention according to claim 8 is equipped with the chemisorption filter which carries out adsorption treatment of the chemical pollutant to the defecation air distribution channel from an adsorption member to the substrate processing section in a substrate processor according to claim 2 to 7.
[0016] Invention according to claim 9 is equipped with the temperature-and-humidity controller which adjusts the temperature and humidity of defecation air to the defecation air distribution channel from an adsorption member to the substrate processing section in a substrate processor according to claim 2 to 8.
[0017] In a substrate processor according to claim 2 to 9, invention according to claim 10 collects the air which circulated the substrate processing section, and is equipped with the circulation path which returns this air to a defecation processing location.
[0018] Invention according to claim 11 makes free passage connection of the open air incorporation path of incorporating the open air for the circulation path which hits the superior side of a defecation processing location, in a substrate processor according to claim 10.
[0019]
[Function] The operation of this invention is as follows. According to invention according to claim 1, non-clarification air is incorporated by adsorption treatment equipment, and adsorption treatment of the chemical pollutant in non-clarification air is carried out. The air (a cleanliness class is ten or less defecation air) defecated by adsorption treatment equipment is sent to the substrate processing section through a defecation air distribution channel. The pollutant which seceded from adsorption treatment equipment is discharged through an exhaust air path. Defecation processing is again presented with the adsorption treatment equipment from which the pollutant seceded.
[0020] According to invention according to claim 2, non-clarification air is incorporated by the adsorption member in a defecation processing location, and adsorption treatment of the chemical pollutant in non-clarification air is carried out by the adsorption member. The air defecated by the adsorption member is sent to the substrate processing section through a defecation air distribution channel. The adsorption member which adsorbed the chemical pollutant is displaced

from a defecation processing location to a regeneration location with a displacement means. A regeneration means makes a pollutant secede from an adsorption member by giving predetermined regeneration to the adsorption member displaced in the regeneration location. The pollutant from which it seceded is discharged through an exhaust air path. By the displacement means, the reproduced adsorption member is again displaced to a defecation processing location, and defecation processing is presented with it.

[0021] According to invention according to claim 3, when a displacement means carries out the rotation variation rate of the adsorption member, in a regeneration location, regeneration of other parts of an adsorption member is performed for defecation processing in parallel in a defecation processing location using a part of adsorption member, respectively.

[0022] According to invention according to claim 4, when a displacement means carries out the straight-line variation rate of the adsorption member, in a regeneration location, regeneration of other parts of an adsorption member is performed for defecation processing in parallel in a defecation processing location using a part of adsorption member, respectively.

[0023] According to invention according to claim 5, the pollutant which is sticking to an adsorption member breaks away by heating the adsorption member which has a regeneration means in a regeneration location. The pollutant from which it seceded is discharged through an exhaust air path.

[0024] According to invention according to claim 6, the adsorption member heated in the regeneration location is displaced in a cooling processing location, and it is cooled compulsorily, it is displaced in a defecation processing location after that, and defecation processing is presented with it.

[0025] According to invention according to claim 7, before the dust which passed the adsorption member, or the dust generated from the adsorption member itself results in the substrate processing section, prehension removal of it is carried out with a dust removal filter.

[0026] According to invention according to claim 8, even if it passes an adsorption member, without some pollutants' being removed by the adsorption member and going out, as a result of the concentration of the chemical pollutant in non-clarification air rising suddenly, before the pollutant results in the substrate processing section, adsorption treatment of it is carried out with a chemisorption filter.

[0027] According to invention according to claim 9, the defecation air which passed the adsorption member is supplied to the substrate processing section, after temperature and humidity are adjusted by the temperature-and-humidity controller.

[0028] According to invention according to claim 10, the air which circulated the substrate processing section is returned to a defecation processing location through a circulation path, and is incorporated by the adsorption member. Adsorption treatment of the organic substance which is contained in the collected air and which was generated inside equipment is carried out by the adsorption member. The air defecated by the adsorption member is again supplied to the substrate processing section.

[0029] According to invention according to claim 11, even if lack arises to air required for circulation since all the air that circulated the substrate processing section is not collected, the air of the insufficiency is filled up into a circulation path through an open air incorporation path, and is sent to a defecation processing location.

[0030]

[Embodiment of the Invention] Hereafter, the example of this invention is explained with reference to a drawing.

<1st example> drawing 1 is drawing having shown the outline configuration of the 1st example of the substrate processor concerning this invention. The substrate processor concerning this example is roughly divided, it incorporates the open air (non-clarification air), carries out adsorption treatment of the chemical pollutant under open air to the body 10 of a processor (spin coater) which carries out rotation spreading of the photoresist agent at substrates, such as a semi-conductor wafer, and consists of adsorption treatment equipment 20 with which a cleanliness class supplies ten or less defecation air (only henceforth "defecation air") to the body 10 of a processor.

[0031] The cleanliness class in this specification carries out the grade division of the cleanliness level, and a cleanliness class is 1ft3 or less in ten. It expresses that a particulate number with a particle size of 0.1 micrometers or more contained in air is ten or less pieces.
[0032] The body 10 of a processor equips the substrate with two or more substrate processing sections 11 which carry out rotation spreading of the photoresist agent. A dust removal filter 12 like a ULPA (ultra low penetration air-filter) filter is arranged above the substrate processing section 11. The defecation air generated with adsorption treatment equipment 20 is sent to the body 10 of a processor through the defecation air distribution channel 13, passes the dust removal filter 12, and is supplied to the substrate processing section 11. The defecation air supplied to the substrate processing section 11 serves as the so-called downflow, and circulates. The air which circulated the substrate processing section 11 is emitted from the base of the body 10 of a processor, and is discharged through the jet pipe which was prepared in the bottom of a floor line floor line and which is not illustrated.
[0033] Next, the configuration of adsorption treatment equipment 20 is explained with reference to drawing 5 . Adsorption treatment equipment 20 is equipped with the refreshable adsorption member 21 which secedes from the pollutant to which it stuck by being heated while it incorporates the open air and adsorbs chemical pollutants, such as ammonia under open air, an organic solvent, and acid.
[0034] The adsorption member 21 of this example is equipped with the vesicular structure (for example, honeycomb structure) to which a gas can circulate, and has the shape of a disk type whose thickness is about 30-60cm as the whole whose diameter is about 100-150cm. The belt 23 is wound between that peripheral surface and output shaft of a motor 22, and this adsorption member 21 is constituted possible [rotation displacement] at the circumference of an axial center Q. The defecation processing location P1 which defecates non-clarification air, the regeneration location P2 made to secede from the pollutant which stuck to the adsorption member 21, and the cooling processing location P3 which cools the adsorption member 21 are fixed and set as the surroundings of this axial center Q. When the adsorption member 21 carries out rotation displacement continuously with a low speed, the adsorption member 21 passes through each locations P1, P2, and P3 in the order. A motor 22 and a belt 23 are equivalent to the displacement means in this invention.
[0035] The adsorption member 21 is formed in the honeycomb configuration in which the parallel air hole of a large number formed in the wall surface of the direction of the revolving-shaft heart penetrates the adsorption member 21 by adhering to the ingredient which has the water resisting property of for example, ceramic paper etc., and waterproof steam nature according to sinking [of aquosity dispersion] in, and carrying out stoving of the hydrophobic zeolite to it. The wall surface of an air hole is using the hydrophobic zeolite as the principal component, and a hydrophobic zeolite can contact effectively to the air current which circulates the inside of an air hole. A zeolite has the adsorption engine performance which was excellent to ammonia etc.
[0036] In addition, in the air circulation direction, the adsorption member 21 may carry out the laminating of two or more kinds of adsorption members to multistage, and may constitute them multistage. For example, the adsorption member of the preceding paragraph is formed by the activated carbon which was excellent in the adsorption engine performance of an organic substance in the latter adsorption member with the zeolite. Thus, by combining two or more sorts of adsorption members, the defecation function according to the chemical pollutant which exists in the open air can be given to the adsorption member 21. Moreover, the adsorption member 21 can adopt various modes, such as not only honeycomb structure but a pellet type.
[0037] The defecation processing location P1 is faced the end of the circulation way L1 of non-clarification air, and it is carrying out opening. On both sides of the adsorption member 21, it takes out in end opening of the circulation way L1, and the location which counters, there is an opening edge of passage L2, and the processing fan 24 is formed in this passage L2. The dust in the air which passed the adsorption member 21 is prepared in the filters 25 of a rough ******** sake on the processing fan's 24 poor side stream way L2. The body 10 of a processor is sent through a distribution channel 13 in the defecation air acquired through filters 25. The processing fan's 24 poor side stream way L2 has branched, and a part of air which passed the adsorption

member 21 is led to the cooling processing location P3 through the branching passage L3. The branching passage L3 which leads the air for cooling to the cooling processing location P3 at the adsorption member 21 is equivalent to the cooling means in this invention.
[0038] On both sides of the adsorption member 21, the opening edge of passage L4 is located in end opening of the branching passage L3, and the location which counters. The air which passed the adsorption member 21 is sent to a heater 26 through passage L4. The air (hot blast) heated at the heater 26 is led to the regeneration location P2 through passage L5. The heater 26 and passage L5 which send hot blast to the regeneration location P2 are equivalent to the regeneration means in this invention.
[0039] On both sides of the adsorption member 21, the opening edge of passage L6 is located in end opening of passage L5, and the location which counters. The ventilating fan 27 is formed in this passage L6. A part of non-clarification air which flows passage L1 is sent to passage L6 through the branching passage L7, and exhaust air is performed smoothly. The hot blast which passed the adsorption member 21 is discharged in the regeneration location P2 through the exhaust air path 28 (refer to drawing 1) connected to the lower part side of a ventilating fan 27.
[0040] Next, actuation of the substrate processor equipped with the configuration mentioned above is explained. The low-speed rotation drive of the adsorption member 21 is continuously carried out by the motor 22 during operation of this equipment. If the processing fan 24 operates, the open air (non-clarification air) will be incorporated by adsorption treatment equipment 20. When non-clarification air passes through the part of the adsorption member 21 in the defecation processing location P1, the chemical pollutant contained in non-clarification air, for example, ammonia, an organic solvent, the acid, etc. are adsorbed and removed by the adsorption member 21. The defecation air from which the chemical pollutant was removed is sent to the body 10 of a processor through filters 25 and the defecation air distribution channel 13. Thus, in the clarification processing location P1, defecation processing is continuously performed by circulating non-clarification air to the adsorption member 21 which carries out rotation displacement.
[0041] the part of the adsorption member 21 which adsorbed the chemical pollutant in the defecation processing location P1 -- rotation of the adsorption member 21 -- the regeneration location P2 is arrived at with a variation rate. In the regeneration location P2, when a ventilating fan 27 operates, the hot blast sent from the heater 26 passes through the part of the adsorption member 21. The part of the adsorption member 21 heated by hot blast secedes from the chemical pollutant to which it was sticking. The chemical pollutant from which it seceded rides the flow of hot blast, circulates passage L6, and is exhausted through a ventilating fan 27 and the exhaust air path 28. This exhaust air air is included where the chemical pollutant which seceded from the adsorption member 21 is condensed. Thus, in the regeneration location P2, regeneration is continuously performed by circulating hot blast to the adsorption member 21 which carries out rotation displacement.
[0042] the part of the adsorption member 21 reproduced in the regeneration location P2 -- rotation of the adsorption member 21 -- the cooling processing location P3 is arrived at with a variation rate. In the cooling processing location P3, a part of air from which the adsorption member 21 was passed and the chemical pollutant was removed is drawn in the branching passage L3, and it passes through the part of the adsorption member 21. Thereby, air cooling of the part of the adsorption member 21 which was carrying out the temperature rise is carried out, and it returns to ordinary temperature quickly. The air which passed through the part of the adsorption member 21 is sent to a heater 26, and a reuse is changed and carried out to hot blast. Thus, in the cooling processing location P3, cooling processing is continuously performed by circulating defecation air to the adsorption member 21 which carries out rotation displacement.
[0043] since according to the adsorption-treatment equipment 20 shown in drawing 5 as mentioned above it carries out by locating other parts of the adsorption member 21 in the regeneration location P2, and carrying out the concurrency of defecation processing and the regeneration when a part of adsorption member 21 is in the defecation processing location P1 -- the former -- "-- it can save up, it is not necessary to exchange frequently like the

chemisorption filter of formula", and the running cost of equipment can be reduced. Moreover, since it is not necessary to interrupt defecation processing temporarily for regeneration, defecation air can be supplied to the body 10 of a processor continually, and the operation effectiveness of equipment can be improved. Furthermore, in the cooling processing location P3, since the adsorption member 21 which is carrying out the temperature rise is cooled compulsorily, the part of the adsorption member 21 which regeneration finished can be used for the defecation processing location P1 between short time, returning it.

[0044] Drawing 1 is referred to. The defecation air sent from adsorption treatment equipment 20 is supplied to the substrate processing section 11 through the dust removal filter 12 of the body 10 of a processor. The dust removal filter 12 is the dust contained in the open air, catches certainly the minute dust which was not removed with adsorption treatment equipment 20, or the minute dust generated with adsorption treatment equipment 20, and removes it. Consequently, the pure air which does not contain not only a chemical pollutant but minute dust in the substrate processing section 11 is supplied, and the quality of substrate processing can be raised.

[0045] <2nd example> drawing 2 is drawing having shown the outline configuration of the 2nd example of the substrate processor concerning this invention. In drawing 2 , since each part shown with the same sign as each sign in drawing 1 is the same component as the equipment of the 1st example, explanation here is omitted.

[0046] the description of this example is in the point of having formed the chemisorption filter 14 from which a chemical pollutant is adsorbed and removed at the defecation air distribution channel 13 from adsorption treatment equipment 20 to the substrate processing section 11 of the body 10 of a processor (this example -- the end of the defecation air distribution channel 13). On both sides of the auxiliary fan 15, the dust removal filter 12 is formed in the lower part side of the chemisorption filter 14. That is, in this example, two steps of defecation processings with removal of the chemical pollutant by the adsorption member 21 of adsorption treatment equipment 20 and removal of a chemical pollutant with the chemisorption filter 14 by the side of the body 10 of a processor are performed.

[0047] Since adsorption treatment of it is carried out with the chemisorption filter 14 before the chemical pollutant results in the substrate processing section 11 even if some pollutants are sent to the body 10 of a processor according to this example, without being removed by adsorption treatment equipment 20 and going out, as a result of the concentration of the chemical pollutant of the open air rising suddenly, the substrate processing section 11 does not receive a bad influence with a chemical pollutant. Moreover, since most chemical pollutants of the open air are removed by adsorption treatment equipment 20, it is not necessary to exchange frequently the chemisorption filter 14 of the body 10 of a processor.

[0048] <3rd example> drawing 3 is drawing having shown the outline configuration of the 3rd example of the substrate processor concerning this invention. In drawing 3 , since each part shown with the same sign as each sign in drawing 1 is the same component as the equipment of the 1st example, explanation here is omitted.

[0049] The description of this example is in the point of having formed the temperature-and-humidity controller 30 which adjusts the temperature and humidity of defecation air to the defecation air distribution channel 13 from adsorption treatment equipment 20 to the substrate processing section 11 of the body 10 of a processor. In addition, a sign 31 is the built-in fan with whom the temperature-and-humidity controller 30 was equipped.

[0050] According to this example, since the defecation air acquired with adsorption treatment equipment 20 is supplied to the substrate processing section 11 of the body 10 of a processor after the temperature and humidity are adjusted, the substrate processing section 11 does not receive the bad influence of the temperature of a perimeter environment, and humidity. In addition, you may make it form the chemisorption filter 14 in the defecation air distribution channel 13 also in this example like the 2nd example shown in drawing 2 .

[0051] <4th example> drawing 4 is drawing having shown the outline configuration of the 4th example of the substrate processor concerning this invention. In drawing 4 , since each part shown with the same sign as each sign in drawing 1 - drawing 3 is the same component as each

equipment of the 1st - the 3rd example, explanation here is omitted.
[0052] The description of this example collects the air which circulated the substrate processing section 11 of the body 10 of a processor at the pars basilaris ossis occipitalis of the body 10 of a processor, and is in the point of returning this air to adsorption treatment equipment 20 (defecation processing location P1 specifically shown in drawing 5) through the circulation path 16.
[0053] According to this example, even if contained in the air from which the organic solvent ambient atmospheres generated in the body of processor 10 interior were collected, adsorption treatment of the organic solvent is carried out by the adsorption member 21 in adsorption treatment equipment 20. Moreover, since it regenerates the adsorption member 21 of adsorption treatment equipment 20 in parallel to defecation processing as mentioned above, there is also no un-arranging [that the engine performance deteriorates by adsorption of an organic solvent, or exchange frequency increases like the chemisorption filter with which equipment was equipped conventionally].
[0054] In addition, as for the air which circulates the inside of the body 10 of a processor, not all are necessarily collected. When lack produces the circulation path 16 in the circulating air content, it becomes impossible consequently, to supply the defecation air of a complement to the substrate processing section 11. So, in this example, free passage connection of the open air incorporation path 17 for incorporating the open air for the circulation path 16 which hits the superior side of adsorption treatment equipment 20, and compensating it with the air content of an insufficiency is made.
[0055] The modification of the adsorption treatment equipment which <5th example> drawing 6 is replaced with the adsorption treatment equipment 20 shown in drawing 5 , and can be used in the 1st - the 4th example which were mentioned above is shown. Although the adsorption treatment equipment 20 shown in drawing 5 was constituted so that the rotation variation rate of the adsorption member 21 might be carried out, the adsorption treatment equipment 20 of this example has the description in carrying out the straight-line variation rate of the adsorption member 21. It explains concretely below.
[0056] The adsorption member 21 used by this example is adsorption member 21L which is a rectangle-like as the whole and is in the bottom in drawing 6 . Adsorption member 21U with the bottom It is connected through heat insulation member 21a. The component of the adsorption member 21 is the same as that of what was explained by drawing 5 . This adsorption member 21 is connected with rod 29a of a pneumatic cylinder 29. a pneumatic cylinder 29 has a part of adsorption member 21 (21L or 21U) in the defecation processing location P1 -- coming -- other parts (21U or 21L) of the adsorption member 21 -- regeneration location P2U Or P2L As it is, the straight-line variation rate of the adsorption member 21 is carried out. This pneumatic cylinder 29 is equivalent to the displacement means in this invention. Regeneration location P2U which serves as a cooling processing location in this example, and P2L There are two places.
[0057] The defecation processing location P1 is faced the end of the circulation way L1 of non-clarification air, and it is carrying out opening. On both sides of the adsorption member 21, it takes out in end opening of the circulation way L1, and the location which counters, there is an opening edge of passage L2, and this passage L2 is open for free passage to the defecation air distribution channel 13 through the processing fan 24 and filters 25. The processing fan's 24 poor side stream way L2 has branched, and a part of air which passed the adsorption member 21 is sent to a heater 26 through the branching passage L3. Moreover, the branching passage L3 minds the passage change-over machines V1 and V2, and is regeneration location P2U and P2L. It is connected. each -- regeneration location P2U and P2L Passage L6U which was open for free passage to the ventilating fan 27 through the passage change-over machine V3 at the lower part side, and L6L It is. Furthermore, in the skillful side stream way of a ventilating fan 27, the branching passage L7 which incorporates a part of non-clarification air is open for free passage.
[0058] Next, actuation of adsorption treatment equipment 20 equipped with the configuration mentioned above is explained. As the continuous line of drawing 6 shows now, rod 29a of a pneumatic cylinder 29 contracts, and it is upper adsorption member 21U. To the defecation processing location P1, it is lower adsorption member 21L. Lower regeneration location P2L

Suppose that it is, respectively.
[0059] The non-clarification air which circulates passage L1 is adsorption member 21U of the top in the defecation processing location P1. A chemical pollutant is adsorbed and removed and the defecation air is sent to the body 10 of a processor through passage L2 and the defecation air distribution channel 13. on the other hand -- lower regeneration location P2L **** -- the defecation processing mentioned above -- being concurrent -- lower adsorption member 21L Playback / cooling processing is performed as follows.
[0060] First, lower adsorption member 21L In order to supply and exhaust hot blast, the direction of passage of the passage change-over machines V1-V3 is set up as the continuous line showed to drawing 6 . Consequently, through the branching passage L3, a part of defecation air which circulates passage L2 is sent to a heater 26, and it is heated. The heated air (hot blast) minds the passage change-over machines V1 and V2, and is lower regeneration location P2L. It is sent. Lower adsorption member 21L The chemical pollutant from which it seceded when hot blast circulated rides on hot blast, and is exhausted through passage L6L, the passage change-over machine V3, a ventilating fan 27, and the exhaust air path 28.
[0061] After regeneration finishes, only the direction of passage of the passage change-over machine V1 is switched as the chain line showed to drawing 6 . Consequently, the air which circulates the branching passage L3 minds the passage change-over machines V1 and V2, and it is lower regeneration location P2L. Adsorption member 21L of the bottom which it was sent and regeneration finished It is cooled compulsorily.
[0062] Upper adsorption member 21U If it continues over a proper period and is used for defecation processing, before the defecation engine performance falls, it is lower adsorption member 21L. It changes. Specifically, it is lower adsorption member 21L by expanding rod 29a of a pneumatic cylinder 29. To the defecation processing location P1, it is upper adsorption member 21U. Upper regeneration location P2U A straight-line variation rate is carried out, respectively. Consequently, adsorption member 21U of the bottom new (the defecation function was reproduced) in the defecation processing location P1 It is carried out by using and defecation processing continuing.
[0063] On the other hand, it is upper regeneration location P2U. When regenerating, it switches to the location which shows the direction of passage of the passage change-over machine V3 to the location which shows the direction of passage of the passage change-over machine V2 to the location which shows the direction of passage of the passage change-over machine V1 as the continuous line of drawing 6 with the chain line of drawing 6 with the chain line of drawing 6 , respectively. Consequently, the passage change-over machines V1 and V2 are minded from a heater 26, and hot blast is upper regeneration location P2U. It is sent and is upper adsorption member 21U. It regenerates. upper adsorption member 21U from -- the chemical pollutant from which it seceded is exhausted through the passage change-over machine V3, a ventilating fan 27, etc. which were switched to the chain-line location. After regeneration finishes, the same with having mentioned above, only the direction of passage of the passage change-over machine V1 is switched, and it is upper regeneration location P2U. The air for cooling is sent and it is upper adsorption member 21U. Forced cooling is carried out.
[0064] as mentioned above, with the adsorption treatment equipment 20 of this example Upper adsorption member 21U While performing defecation processing Lower adsorption member 21L It regenerates and is lower adsorption member 21L conversely. While performing defecation processing Upper adsorption member 21U Since the concurrency of defecation processing and the regeneration is carried out and they are performed as it regenerates, while being able to aim at reduction of the running cost of equipment, the operation effectiveness of equipment can be improved like the case of the adsorption treatment equipment stated by drawing 5 .
[0065] In addition, this invention is not limited to the thing of each example mentioned above, but deformation implementation can also be carried out as follows.
(1) Although it was made to make it secede from the chemical pollutant which stuck to the adsorption member 21 by sending hot blast to the adsorption member 21 in the regeneration location P2 in each example, you may make it secede from a pollutant by heating the adsorption member 21 directly at a heater etc.

[0066] (2) Don't restrict regeneration of the adsorption member in this invention to what is depended on heating. For example, the chemical pollutant of an adsorption member is disassembled and you may make it make it break away by replacing with the heater 26 shown in drawing 5 or drawing 6 , forming an ozonator, and supplying the raw gas containing high-concentration ozone to an adsorption member.
[0067] (3) Although the body 10 of a processor was equipped with the dust removal filter 12 or the chemisorption filter 14, it replaces with these filters or you may make it have a charcoal filter with these filters in each example.
[0068] (4) Although the spin coater which applies a photoresist to a substrate as a substrate processor was illustrated in each example, this invention is applicable to the various substrate processors handling the substrate with which the photoresist was applied, for example, an aligner, a developer, a drug solution processor, etc.
[0069]
[Effect of the Invention] According to this invention, the following effectiveness is done so so that clearly from the above explanation. Since it was made to secede from a pollutant and has discharged from this adsorption treatment equipment while according to invention according to claim 1 carrying out adsorption treatment of the chemical pollutant in non-clarification air with adsorption treatment equipment and supplying defecation air to the substrate processing section, defecation processing can be presented with adsorption treatment equipment over a long period of time, and the running cost of equipment can be reduced.
[0070] Since make a regeneration location carry out the variation rate of the adsorption member which adsorbed the chemical pollutant in the defecation processing location, it regenerates, this adsorption member is again returned to a defecation processing location and he is trying to present defecation processing according to invention according to claim 2, it is not necessary to exchange an adsorption member frequently, and the running cost of equipment can be decreased.
[0071] Since the variation rate of the adsorption member is carried out between a defecation processing location and a regeneration location according to claim 3 and invention according to claim 4, performing defecation processing using a part of adsorption member, and regeneration of other parts of an adsorption member in parallel, there is nothing in the latency time to exchange of the adsorption member with which defecation processing is presented, and it can supply, without breaking off defecation air to the substrate processing section.
[0072] Since according to invention according to claim 5 the adsorption member in a regeneration location is heated and it is made to secede from a pollutant, an adsorption member can be regenerated efficiently.
[0073] Since according to invention according to claim 6 the adsorption member heated in the regeneration location was cooled compulsorily in the cooling processing location and it has returned to the defecation processing location, it is not necessary to carry out long duration standby like [in the case of cooling naturally the adsorption member which it regenerated] for cooling. That is, the adsorption member which it regenerated can be returned to a defecation processing location in a short time, and the utilization ratio of an adsorption member can be raised so much.
[0074] Since according to invention according to claim 7 prehension removal of it is carried out with a dust removal filter before the dust which passed the adsorption member, or the dust generated from the adsorption member itself results in the substrate processing section, the substrate processing section is not polluted with dust.
[0075] Since according to invention according to claim 8 this pollutant is removed with both a refreshable adsorption member and a chemisorption filter even if the concentration of the chemical pollutant in non-clarification air rises suddenly, there is no sudden thing of a perimeter environment for which the substrate processing section receives a bad influence even if it depends unusually.
[0076] According to invention according to claim 9, since the defecation air which passed the adsorption member is supplied to the substrate processing section after the temperature and humidity are adjusted, the substrate processing section does not receive the bad influence of

the temperature of a perimeter environment, and humidity.
[0077] Since the refreshable adsorption member is made to be placed between the circulation paths which reuse the air which circulated the substrate processing section according to invention according to claim 10, even if it is contained in the air from which the organic solvent ambient atmospheres generated inside equipment were collected, adsorption treatment of the organic solvent is carried out by the adsorption member. Moreover, since it is reproduced when it displaces in a regeneration location, an adsorption member does not have un-arranging [that the exchange frequency of an adsorption member increases by adsorption of an organic solvent], either.
[0078] Since according to invention according to claim 11 the air of an insufficiency is filled up through an open air incorporation path even if all the air that circulated the substrate processing section is not collected, sufficient quantity of defecation air can be supplied to the substrate processing section.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is drawing showing the outline configuration of the 1st example of the substrate processor concerning this invention.
[Drawing 2] It is drawing showing the outline configuration of the 2nd example.
[Drawing 3] It is drawing showing the outline configuration of the 3rd example.
[Drawing 4] It is drawing showing the outline configuration of the 4th example.
[Drawing 5] It is drawing showing the outline configuration of the adsorption treatment equipment used for the 1st - the 4th example.
[Drawing 6] It is drawing showing the outline configuration of the adsorption treatment equipment concerning the 5th example.
[Description of Notations]
10 -- Body of a processor
11 -- Substrate processing section
12 -- Dust removal filter
13 -- Defecation air distribution channel
14 -- Chemisorption filter
20 -- Adsorption treatment equipment
21 -- Adsorption member
22 -- Motor
26 -- Heater
28 -- Exhaust air path
29 -- Pneumatic cylinder
30 -- Temperature-and-humidity controller

[Translation done.]

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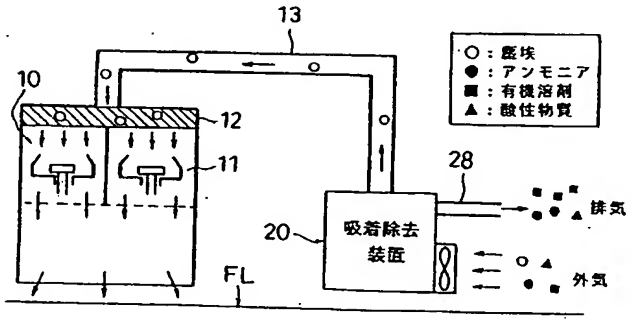
(54)【発明の名称】基板処理装置

(57)【要約】

【課題】　周囲環境中の汚染物質を効果的に取り除いて装置のランニングコストを低減することができる基板処理装置を提供する。

【解決手段】　処理装置本体１０は清浄化空気流通経路１３を介して吸着除去装置２０につながれている。吸着除去装置２０は、外気中の化学的汚染物質を吸着するとともに、加熱などの処理により再生される吸着部材を備える。吸着部材の一部を使った清浄化処理と、吸着部材の他の部位の再生処理とは同時並行して行われる。吸着除去装置２０で得られた清浄化空気は、塵埃除去フィルタ１２を介して基板処理部１１に供給される。吸着除去装置２０の吸着部材は再生使用されるので、装置のランニングコストを低減することができる。



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【特許請求の範囲】

【請求項１】　基板処理部に清浄度クラスが１０以下の清浄化空気を供給する手段を備えた基板処理装置において、

非清浄空気を取り込んで非清浄空気中の化学的汚染物質を吸着する吸着除去装置と、

吸着除去装置から清浄化された空気を基板処理部に導く清浄化空気流通経路と、

吸着除去装置から離脱された汚染物質を排出する排気経路とを備えたことを特徴とする基板処理装置。

【請求項２】　請求項１に記載の基板処理装置において、吸着除去装置は、

化学的汚染物質を吸着するとともに、再生処理により、吸着した汚染物質を離脱する再生可能な吸着部材と、

この吸着部材を、非清浄空気を清浄化する清浄化処理位置と、吸着した汚染物質を離脱させる再生処理位置とにわたって変位させる変位手段と、

再生処理位置にある吸着部材から汚染物質を離脱させる再生処理手段とを備えたことを特徴とする基板処理装置。

【請求項３】　請求項２に記載の基板処理装置において、

変位手段は、吸着部材の一部が清浄化処理位置にあるときは、吸着部材の他の部位が再生処理位置にあるように、吸着部材を回転変位させる基板処理装置。

【請求項４】　請求項２に記載の基板処理装置において、

変位手段は、吸着部材の一部が清浄化処理位置にあるときは、吸着部材の他の部位が再生処理位置にあるように、吸着部材を直線変位させる基板処理装置。

【請求項５】　請求項２～４のいずれかに記載の基板処理装置において、

再生処理手段は、再生処理位置にある吸着部材を加熱することにより、吸着部材から汚染物質を離脱させる基板処理装置。

【請求項６】　請求項５に記載の基板処理装置において、

変位手段は、再生処理位置から清浄化処理位置へ吸着部材を変位させる途中で、吸着部材を冷却処理位置に変位させ、

この冷却処理位置に吸着部材を冷却する冷却手段を備えた基板処理装置。

【請求項７】　請求項２～６のいずれかに記載の基板処理装置において、

吸着部材から基板処理部に至る清浄化空気流通経路に塵埃を除去する塵埃除去フィルタを備えた基板処理装置。

【請求項８】　請求項２～７のいずれかに記載の基板処理装置において、

吸着部材から基板処理部に至る清浄化空気流通経路に化学的汚染物質を吸着除去する化学吸着フィルタを備えた

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基板処理装置。

【請求項９】　請求項２～８のいずれかに記載の基板処理装置において、

吸着部材から基板処理部に至る清浄化空気流通経路に清浄化空気の温度および湿度を調整する温湿度コントローラを備えた基板処理装置。

【請求項１０】　請求項２～９のいずれかに記載の基板処理装置において、

基板処理部を流通した空気を回収し、この空気を清浄化処理位置に戻す循環経路を備えた基板処理装置。

【請求項１１】　請求項１０に記載の基板処理装置において、

清浄化処理位置の上手側にあたる循環経路に、外気を取り込む外気取り込み経路を連通接続した基板処理装置。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明は、半導体ウエハや液晶表示器用のガラス基板などの基板にフォトレジスト膜を塗布形成する装置、あるいはフォトレジスト膜が形成された基板に露光、現像、薬液処理、洗浄処理などを施す基板処理装置に係り、特にこの種の基板処理装置において周囲環境中の汚染物質を除去するための技術に関する。

【０００２】

【従来の技術】半導体ウエハなどの基板に微細回路パターンを形成するフォトリソグラフィ工程、例えば基板にフォトレジスト剤を回転塗布するスピンコータでは、回路パターンのますますの微細化に伴い、化学増幅型レジストの使用が主流になりつつある。化学増幅型フォトレジストは、周囲環境中に例えばアンモニア等の化学物質が存在すると、化学反応過程が阻害され、必要とされる微細回路の形成が困難になることが知られている。また、最近では、周囲環境中に存在する、アンモニア以外の物質、例えばＮＭＰ（Ｎ－メチルピロリドン）や酸性物質などによっても悪影響を受けることも確認されている。したがって、上述したスピンコータや、その他フォトレジスト膜が形成された基板に種々の処理を行う基板処理装置において、周囲環境に存在する汚染物質をどのようにして取り除いて清浄な環境を作り出すかが、半導体デバイスの集積度や生産性の向上に大きく関わってきている。

【０００３】周囲環境を極力清浄にするという要請に応えるために、最近では、基板処理装置の上部からダウンフローとして供給する空気の送風経路に、例えば「表面に酸性物質を付着させ、アンモニア等のアルカリ性物質を取り除けるようにした化学吸着フィルタ」や、「アンモニア等だけでなく、大気中に存在する有機物質も除去可能な活性炭フィルタ」等を装着し、装置内部に供給する空気を清浄にするようにしている。

【０００４】

【発明が解決しようとする課題】しかしながら、このような構成を有する従来例の場合には、次のような問題がある。すなわち、上述した化学吸着フィルタや活性炭フィルタなどのフィルタ類は非常に高価であり、しかもこれらのフィルタは原理的には周囲の汚染物質をため込んでいくだけの、いわゆる「ため込み式」であるので、寿命が短く、通常、１年程度しかもたない。そのためフィルタの定期的な交換が必要であり、装置のランニングコストを増加させる一因になっている。

【０００５】また、半導体生産工場の立地条件により、例えば周囲に存在する耕作地域の肥料散布などの影響により、一時的にクリーンルーム内のアンモニア濃度などが異常に高濃度になることがある。このような事態になると、化学吸着フィルタだけでは所望される濃度にまで十分に大気中の汚染物質を濾過することができなくなり、製品に欠陥が突発的に発生してしまう。クリーンルーム内で悪影響を及ぼす薬液をこぼしたり、ガスを漏洩させたりした場合も同様である。これらの事態は化学吸着フィルタの寿命を著しく縮めるという不都合も招く。

【０００６】さらに、スピンコータなどでは、その塗布均一性を確保するために、処理部を温度コントロール、あるいは湿度コントロールしているものが一般的である。このような空調手段のランニングコストを低減させるために、最近では、装置内より排出された気流を回収し、循環して使用する手法が採られることがある。このような循環式の空調手段で問題になるのが、装置内部で発生する有機溶剤雰囲気が多量に循環経路に侵入し、装置に取り付けられたフィルタ類に吸着してしまうことである。フィルタに有機物質が吸着すると、フィルタは本来の性能を発揮することができず、寿命が著しく短くなってしまう。装置側から発生する有機溶剤雰囲気を回収排気する手段もあるが、全ての有機溶剤雰囲気を排気するのは困難であり、またフィルタ種によっては低濃度の有機溶剤雰囲気であっても悪影響を受けることが確認されているので、効果の高い対策を講じることは非常に難しい。

【０００７】本発明は、このような事情に鑑みてなされたものであって、周囲環境中の汚染物質を効果的に取り除いて装置のランニングコストを低減することができる基板処理装置を提供することを主たる目的としている。また、本発明の他の目的は、周囲環境中の汚染物質の濃度が突発的に上昇しても、悪影響を受けない基板処理装置を提供することにある。さらに、本発明は、循環式の空調手段を備えた基板処理装置において、装置側から発生する有機溶剤雰囲気を効果的に除去することを目的としている。

【０００８】

【課題を解決するための手段】本発明は、このような目的を達成するために、次のような構成をとる。すなわち、請求項１に記載の発明は、基板処理部に清浄度クラス１０以下の清浄化空気を供給する手段を備えた基板処理装置において、非清浄空気を取り込んで非清浄空気中の化学的汚染物質を吸着する吸着除去装置と、吸着除去装置から清浄化された空気を基板処理部に導く清浄化空気流通経路と、吸着除去装置から離脱された汚染物質を排出する排気経路とを備えたことを特徴とする。

【０００９】請求項２に記載の発明は、請求項１に記載の基板処理装置において、吸着除去装置は、化学的汚染物質を吸着するとともに、再生処理により、吸着した汚染物質を離脱する再生可能な吸着部材と、この吸着部材を、非清浄空気を清浄化する清浄化処理位置と、吸着した汚染物質を離脱させる再生処理位置とにわたって変位させる変位手段と、再生処理位置にある吸着部材から汚染物質を離脱させる再生処理手段とを備えたものである。

【００１０】請求項３に記載の発明は、請求項２に記載の基板処理装置において、変位手段は、吸着部材の一部が清浄化処理位置にあるときは、吸着部材の他の部位が再生処理位置にあるように、吸着部材を回転変位させるものである。

【００１１】請求項４に記載の発明は、請求項２に記載の基板処理装置において、変位手段は、吸着部材の一部が清浄化処理位置にあるときは、吸着部材の他の部位が再生処理位置にあるように、吸着部材を直線変位させるものである。

【００１２】請求項５に記載の発明は、請求項２～４のいずれかに記載の基板処理装置において、再生処理手段は、再生処理位置にある吸着部材を加熱することにより、吸着部材から汚染物質を離脱させるものである。

【００１３】請求項６に記載の発明は、請求項５に記載の基板処理装置において、変位手段は、再生処理位置から清浄化処理位置へ吸着部材を変位させる途中で、吸着部材を冷却処理位置に変位させ、この冷却処理位置に吸着部材を冷却する冷却手段を備えたものである。

【００１４】請求項７に記載の発明は、請求項２～６のいずれかに記載の基板処理装置において、吸着部材から基板処理部に至る清浄化空気流通経路に塵埃を除去する塵埃除去フィルタを備えたものである。

【００１５】請求項８に記載の発明は、請求項２～７のいずれかに記載の基板処理装置において、吸着部材から基板処理部に至る清浄化空気流通経路に化学的汚染物質を吸着除去する化学吸着フィルタを備えたものである。

【００１６】請求項９に記載の発明は、請求項２～８のいずれかに記載の基板処理装置において、吸着部材から基板処理部に至る清浄化空気流通経路に清浄化空気の温度および湿度を調整する温湿度コントローラを備えたものである。

【００１７】請求項１０に記載の発明は、請求項２～９のいずれかに記載の基板処理装置において、基板処理部を流通した空気を回収し、この空気を清浄化処理位置に

戻す循環経路を備えたものである。

【００１８】請求項１１に記載の発明は、請求項１０に記載の基板処理装置において、清浄化処理位置の上手側にあたる循環経路に、外気を取り込む外気取り込み経路を連通接続したものである。

【００１９】

【作用】本発明の作用は次のとおりである。請求項１に記載の発明によれば、非清浄空気は吸着除去装置に取り込まれて、非清浄空気中の化学的汚染物質が吸着除去される。吸着除去装置によって清浄化された空気（清浄度クラスが１０以下の清浄化空気）は清浄化空気流通経路を介して基板処理部に送られる。吸着除去装置から離脱された汚染物質は排気経路を介して排出される。汚染物質が離脱された吸着除去装置は再び清浄化処理に供される。

【００２０】請求項２に記載の発明によれば、非清浄空気は清浄化処理位置にある吸着部材に取り込まれて、非清浄空気中の化学的汚染物質が吸着部材によって吸着除去される。吸着部材によって清浄化された空気は清浄化空気流通経路を介して基板処理部に送られる。化学的汚染物質を吸着した吸着部材は、変位手段によって清浄化処理位置から再生処理位置へ変位する。再生処理手段は、再生処理位置に変位してきた吸着部材に所定の再生処理を施すことにより、吸着部材から汚染物質を離脱させる。離脱された汚染物質は排気経路を介して排出される。再生された吸着部材は、変位手段によって再び清浄化処理位置へ変位し、清浄化処理に供される。

【００２１】請求項３に記載の発明によれば、変位手段が吸着部材を回転変位させることにより、清浄化処理位置では吸着部材の一部を使って清浄化処理が、再生処理位置では吸着部材の他の部位の再生処理が、それぞれ並行して行われる。

【００２２】請求項４に記載の発明によれば、変位手段が吸着部材を直線変位させることにより、清浄化処理位置では吸着部材の一部を使って清浄化処理が、再生処理位置では吸着部材の他の部位の再生処理が、それぞれ並行して行われる。

【００２３】請求項５に記載の発明によれば、再生処理手段が、再生処理位置にある吸着部材を加熱することにより、吸着部材に吸着している汚染物質が離脱される。離脱された汚染物質は排気経路を介して排出される。

【００２４】請求項６に記載の発明によれば、再生処理位置で加熱された吸着部材は冷却処理位置に変位して強制的に冷却され、その後に清浄化処理位置に変位して清浄化処理に供される。

【００２５】請求項７に記載の発明によれば、吸着部材を通過した塵埃、あるいは吸着部材そのものから発生した塵埃は、基板処理部に至る前に塵埃除去フィルタによって捕捉除去される。

【００２６】請求項８に記載の発明によれば、非清浄空気中の化学的汚染物質の濃度が突発的に上昇した結果、汚染物質の一部が吸着部材によって除去され切れずに吸着部材を通過しても、その汚染物質は基板処理部に至る前に化学吸着フィルタによって吸着除去される。

【００２７】請求項９に記載の発明によれば、吸着部材を通過した清浄化空気は温湿度コントローラで温度および湿度が調整された後に基板処理部に供給される。

【００２８】請求項１０に記載の発明によれば、基板処理部を流通した空気は、循環経路を介して清浄化処理位置に戻されて吸着部材に取り込まれる。回収された空気中に含まれる、装置内部で発生した有機物質は、吸着部材によって吸着除去される。吸着部材によって清浄化された空気は再び基板処理部に供給される。

【００２９】請求項１１に記載の発明によれば、基板処理部を流通した空気の全てが回収されないために循環に必要な空気に不足が生じても、その不足分の空気は外気取り込み経路を介して循環経路中に補充されて清浄化処理位置に送られる。

【００３０】

【発明の実施の形態】以下、図面を参照して本発明の実施例を説明する。

＜第１実施例＞図１は本発明に係る基板処理装置の第１実施例の概略構成を示した図である。本実施例に係る基板処理装置は、大きく分けて半導体ウエハなどの基板にフォトレジスト剤を回転塗布する処理装置本体（スピンコータ）１０と、外気（非清浄空気）を取り込んで外気中の化学的汚染物質を吸着除去し、清浄度クラスが１０以下の清浄化空気（以下、単に「清浄化空気」という）を処理装置本体１０へ供給する吸着除去装置２０とから構成されている。

【００３１】本明細書中の清浄度クラスとは、清浄度レベルを等級分けしたものであり、清浄度クラスが１０以下とは、１ｆｔ^{3}の空気中に含まれる粒径０．１μｍ以上の微粒子数が１０個以下であることを表す。

【００３２】処理装置本体１０は、基板にフォトレジスト剤を回転塗布する複数個の基板処理部１１を備えている。基板処理部１１の上方には、ＵＬＰＡ（ultra low penetration air-filter）フィルタのような塵埃除去フィルタ１２が配設されている。吸着除去装置２０で生成された清浄化空気は清浄化空気流通経路１３を介して処理装置本体１０に送られ、塵埃除去フィルタ１２を通過して基板処理部１１に供給される。基板処理部１１に供給された清浄化空気は、いわゆるダウンフローとなって流通する。基板処理部１１を流通した空気は処理装置本体１０の底面から放出され、床面ＦＬの下に設けられた図示しない排気ダクトを介して排出される。

【００３３】次に図５を参照して吸着除去装置２０の構成を説明する。吸着除去装置２０は、外気を取り込んで外気中のアンモニア、有機溶剤、酸性物質などの化学的汚染物質を吸着するとともに、加熱されることにより、

吸着した汚染物質を離脱する再生可能な吸着部材２１を備えている。

【００３４】本実施例の吸着部材２１は気体が流通可能な多孔質構造（例えば、ハニカム構造）を備え、全体としては直径が例えば１００～１５０ｃｍ程度、厚みが例えば３０～６０ｃｍ程度の円板形状である。この吸着部材２１は、その周面とモータ２２の出力軸との間にベルト２３が巻回されており、軸心Ｑ周りに回転変位可能に構成されている。この軸心Ｑの周りに、非清浄空気を清浄化する清浄化処理位置Ｐ１と、吸着部材２１に吸着した汚染物質を離脱させる再生処理位置Ｐ２と、吸着部材２１を冷却する冷却処理位置Ｐ３とが固定して設定されている。吸着部材２１が低速度で連続的に回転変位することにより、吸着部材２１が各位置Ｐ１，Ｐ２，Ｐ３をその順に通過していく。モータ２２およびベルト２３は、本発明における変位手段に相当する。

【００３５】吸着部材２１は、例えばセラミック紙などの耐水性、耐水蒸気性を有する材料に疎水性ゼオライトを水性ディスパージョンの含浸により付着して、加熱乾燥することによって、回転軸芯方向の壁面に形成された多数の並行な通気孔が吸着部材２１を貫通するハニカム形状に形成される。通気孔の壁面は疎水性ゼオライトを主成分としていて、通気孔内を流通する気流に対して疎水性ゼオライトが有効に接触することができる。ゼオライトはアンモニアなどに対して優れた吸着性能を有する。

【００３６】なお、吸着部材２１は、２種類以上の吸着部材を空気流通方向に多段に積層して構成してもよい。例えば、前段の吸着部材をゼオライトで、後段の吸着部材を有機物質の吸着性能に優れた活性炭で形成する。このように２種以上の吸着部材を組み合わせることにより、外気に存在する化学的汚染物質に応じた清浄化機能を吸着部材２１にもたせることができる。また、吸着部材２１はハニカム構造に限らず、ペレット状など種々の態様を採用することができる。

【００３７】非清浄空気の流通路Ｌ１の末端は清浄化処理位置Ｐ１に臨んで開口している。吸着部材２１を挟んで流通路Ｌ１の末端開口と対向する位置に取り出し流路Ｌ２の開口端があり、この流路Ｌ２に処理ファン２４が設けられている。処理ファン２４の下手側流路Ｌ２には吸着部材２１を通過した空気中の塵埃を粗取りするためのフィルタ類２５が設けられている。フィルタ類２５を介して得られた清浄化空気が流通経路１３を介して処理装置本体１０を送られる。処理ファン２４の下手側流路Ｌ２は分岐しており、吸着部材２１を通過した空気の一部が分岐流路Ｌ３を介して冷却処理位置Ｐ３に導かれる。冷却処理位置Ｐ３に吸着部材２１に冷却用空気を導く分岐流路Ｌ３は、本発明における冷却手段に相当する。

【００３８】吸着部材２１を挟んで分岐流路Ｌ３の末端開口と対向する位置に流路Ｌ４の開口端がある。吸着部材２１を通過した空気は流路Ｌ４を介してヒータ２６に送られる。ヒータ２６で加熱された空気（熱風）は流路Ｌ５を介して再生処理位置Ｐ２に導かれる。再生処理位置Ｐ２に熱風を送るヒータ２６および流路Ｌ５は、本発明における再生処理手段に相当する。

【００３９】吸着部材２１を挟んで流路Ｌ５の末端開口と対向する位置に流路Ｌ６の開口端がある。この流路Ｌ６には排気ファン２７が設けられている。流路Ｌ１を流れる非清浄空気の一部は分岐流路Ｌ７を介して流路Ｌ６に送られ、排気が円滑に行われるようになっている。再生処理位置Ｐ２で吸着部材２１を通過した熱風は排気ファン２７の下手側に接続される排気経路２８（図１参照）を介して排出される。

【００４０】次に、上述した構成を備えた基板処理装置の動作を説明する。本装置の稼働中、吸着部材２１はモータ２２によって連続的に低速回転駆動される。処理ファン２４が作動すると、外気（非清浄空気）が吸着除去装置２０に取り込まれる。非清浄空気は清浄化処理位置Ｐ１にある吸着部材２１の部位を通過するときに、非清浄空気中に含まれる化学的汚染物質、例えばアンモニア、有機溶剤、酸性物質などが吸着部材２１に吸着・除去される。化学的汚染物質が除去された清浄化空気はフィルタ類２５および清浄化空気流通経路１３を介して処理装置本体１０に送られる。このように清浄処理位置Ｐ１では、回転変位する吸着部材２１に非清浄空気を流通させることにより清浄化処理が連続して行われる。

【００４１】清浄化処理位置Ｐ１で化学的汚染物質を吸着した吸着部材２１の部位は、吸着部材２１の回転変位によって再生処理位置Ｐ２に達する。再生処理位置Ｐ２では、排気ファン２７が作動することにより、ヒータ２６から送られてきた熱風が吸着部材２１の部位を通過する。熱風によって加熱された吸着部材２１の部位は、吸着していた化学的汚染物質を離脱する。離脱された化学的汚染物質は熱風の流れに乗って流路Ｌ６を流通し、排気ファン２７および排気経路２８を介して排気される。この排気空気は、吸着部材２１から離脱された化学的汚染物質を濃縮した状態で含む。このように再生処理位置Ｐ２では、回転変位する吸着部材２１に熱風を流通させることにより再生処理が連続して行われる。

【００４２】再生処理位置Ｐ２で再生された吸着部材２１の部位は、吸着部材２１の回転変位によって冷却処理位置Ｐ３に達する。冷却処理位置Ｐ３では、吸着部材２１を通過して化学的汚染物質が除去された空気の一部が分岐流路Ｌ３で導かれて、吸着部材２１の部位を通過する。これにより、温度上昇していた吸着部材２１の部位が空冷されて常温に急速に戻る。吸着部材２１の部位を通過した空気はヒータ２６に送られて熱風に変換して再使用される。このように冷却処理位置Ｐ３では、回転変位する吸着部材２１に清浄化空気を流通させることによ

り冷却処理が連続して行われる。

【００４３】以上のように図５に示した吸着除去装置２０によると、吸着部材２１の一部が清浄化処理位置Ｐ１にあるときには、吸着部材２１の他の部位が再生処理位置Ｐ２にあって、清浄化処理と再生処理とを同時並行して行うので、従来の「ため込み式」の化学吸着フィルタなどのように頻繁に交換する必要がなく、装置のランニングコストを低減することができる。また、再生処理のために清浄化処理を一時的に中断する必要もないので、処理装置本体１０へ清浄化空気を絶え間なく供給することができ、装置の稼動効率を向上することができる。さらに、冷却処理位置Ｐ３では、温度上昇している吸着部材２１を強制的に冷却しているので、再生処理の終わった吸着部材２１の部位を短時間の間に清浄化処理位置Ｐ１に戻して使用することができる。

【００４４】図１を参照する。吸着除去装置２０から送られてきた清浄化空気は、処理装置本体１０の塵埃除去フィルタ１２を介して基板処理部１１に供給される。塵埃除去フィルタ１２は、外気に含まれていた塵埃であって吸着除去装置２０で除去されなかった微小な塵埃、あるいは吸着除去装置２０で発生した微小な塵埃を確実に捕捉して除去する。その結果、基板処理部１１には化学汚染物質だけでなく、微小な塵埃を含まない清浄な空気が供給され、基板処理の品質を高めることができる。

【００４５】＜第２実施例＞図２は本発明に係る基板処理装置の第２実施例の概略構成を示した図である。図２において、図１中の各符号と同一の符号で示した各部は、第１実施例の装置と同様の構成部分であるので、ここでの説明は省略する。

【００４６】本実施例の特徴は、吸着除去装置２０から処理装置本体１０の基板処理部１１に至る清浄化空気流通経路１３に（本実施例では、清浄化空気流通経路１３の末端に）、化学的汚染物質を吸着・除去する化学吸着フィルタ１４を設けた点にある。化学吸着フィルタ１４の下手側には、補助ファン１５を挟んで塵埃除去フィルタ１２が設けられている。すなわち、本実施例では、吸着除去装置２０の吸着部材２１による化学的汚染物質の除去と、処理装置本体１０側の化学吸着フィルタ１４による化学的汚染物質の除去との２段階の清浄化処理を行う。

【００４７】本実施例によれば、外気の化学的汚染物質の濃度が突発的に上昇した結果、汚染物質の一部が吸着除去装置２０によって除去されきれずに処理装置本体１０に送られたとしても、その化学的汚染物質は基板処理部１１に至る前に化学吸着フィルタ１４によって吸着除去されるので、基板処理部１１が化学的汚染物質によって悪影響を受けることがない。また、外気の化学的汚染物質の大部分は吸着除去装置２０で除去されるので、処理装置本体１０の化学吸着フィルタ１４を頻繁に交換する必要もない。

【００４８】＜第３実施例＞図３は本発明に係る基板処理装置の第３実施例の概略構成を示した図である。図３において、図１中の各符号と同一の符号で示した各部は、第１実施例の装置と同様の構成部分であるので、ここでの説明は省略する。

【００４９】本実施例の特徴は、吸着除去装置２０から処理装置本体１０の基板処理部１１に至る清浄化空気流通経路１３に清浄化空気の温度および湿度を調整する温湿度コントローラ３０を設けた点にある。なお、符号３１は、温湿度コントローラ３０に備えられた内蔵ファンである。

【００５０】本実施例によれば、吸着除去装置２０で得られた清浄化空気は、その温度および湿度が調整された後に、処理装置本体１０の基板処理部１１に供給されるので、基板処理部１１が周囲環境の温度および湿度の悪影響を受けることがない。なお、本実施例においても、図２に示した第２実施例のように、清浄化空気流通経路１３に化学吸着フィルタ１４を設けるようにしてもよい。

【００５１】＜第４実施例＞図４は本発明に係る基板処理装置の第４実施例の概略構成を示した図である。図４において、図１～図３中の各符号と同一の符号で示した各部は、第１～第３実施例の各装置と同様の構成部分であるので、ここでの説明は省略する。

【００５２】本実施例の特徴は、処理装置本体１０の基板処理部１１を流通した空気を、処理装置本体１０の底部で回収し、この空気を循環経路１６を介して吸着除去装置２０（具体的には、図５中に示した清浄化処理位置Ｐ１）に戻す点にある。

【００５３】本実施例によれば、処理装置本体１０内部で発生した有機溶剤雰囲気が回収された空気中に含まれていても、その有機溶剤は吸着除去装置２０内の吸着部材２１によって吸着除去される。また、上述したように吸着除去装置２０の吸着部材２１は清浄化処理と並行して再生処理されるので、従来装置に備えられていた化学吸着フィルタなどのように、有機溶剤の吸着によって性能が劣化したり、交換頻度が増えるという不都合もない。

【００５４】なお、処理装置本体１０内を流通する空気は、必ずしも全てが回収されるわけではない。その結果、循環経路１６を流通する空気量に不足が生じると、基板処理部１１に必要な量の清浄化空気を供給できなくなる。そこで、本実施例では、吸着除去装置２０の上手側にあたる循環経路１６に、外気を取り込んで不足分の空気量を補うための外気取り込み経路１７を連通接続している。

【００５５】＜第５実施例＞図６は、図５に示した吸着除去装置２０に代えて、上述した第１～第４実施例で用いることが可能な吸着除去装置の変形例を示している。図５に示した吸着除去装置２０は、吸着部材２１を回転

変位させるように構成したが、本実施例の吸着除去装置２０は、吸着部材２１を直線変位させることに特徴がある。以下に具体的に説明する。

【００５６】本実施例で用いられる吸着部材２１は全体としては矩形状であり、図６中で下側にある吸着部材２$1_L$と、上側にある吸着部材２$1_U$とが、断熱部材２１ａを介して連結されている。吸着部材２１の構成材料は、図５で説明したものと同様である。この吸着部材２１は、エアーシリンダ２９のロッド２９ａに連結されている。エアーシリンダ２９は、吸着部材２１の一部（２$1_L$または２$1_U$）が清浄化処理位置Ｐ１にあるきは、吸着部材２１の他の部位（２$1_U$または２$1_L$）が再生処理位置Ｐ2_UまたはＰ2_Lにあるように、吸着部材２１を直線変位させる。このエアーシリンダ２９は、本発明における変位手段に相当する。本実施例では、冷却処理位置を兼ねる再生処理位置Ｐ2_U、Ｐ2_Lは２箇所ある。

【００５７】非清浄空気の流通路Ｌ１の末端は清浄化処理位置Ｐ１に臨んで開口している。吸着部材２１を挟んで流通路Ｌ１の末端開口と対向する位置に取り出し流路Ｌ２の開口端があり、この流路Ｌ２は処理ファン２４、フィルタ類２５を介して清浄化空気流通経路１３に連通している。処理ファン２４の下手側流路Ｌ２は分岐しており、吸着部材２１を通過した空気の一部が分岐流路Ｌ３を介してヒータ２６に送られる。また、分岐流路Ｌ３は、流路切換器Ｖ１，Ｖ２を介して再生処理位置Ｐ2_U、Ｐ2_Lにもつながっている。各再生処理位置Ｐ2_U、Ｐ2_Lの下手側には、流路切換器Ｖ３を介して排気ファン２７に連通した流路Ｌ6_U，Ｌ6_Lがある。さらに、排気ファン２７の上手側流路には、非清浄空気の一部を取り込む分岐流路Ｌ７が連通している。

【００５８】次に、上述した構成を備えた吸着除去装置２０の動作を説明する。いま、図６の実線で示すように、エアーシリンダ２９のロッド２９ａが収縮し、上側の吸着部材２$1_U$が清浄化処理位置Ｐ１に、下側の吸着部材２$1_L$が下側の再生処理位置Ｐ2_Lにそれぞれあるとする。

【００５９】流路Ｌ１を流通する非清浄空気は、清浄化処理位置Ｐ１にある上側の吸着部材２$1_U$で化学的汚染物質が吸着・除去され、その清浄化空気が流路Ｌ２および清浄化空気流通経路１３を介して処理装置本体１０に送られる。一方、下側の再生処理位置Ｐ2_Lでは、上述した清浄化処理と並行して、下側の吸着部材２$1_L$の再生・冷却処理が次のように行われる。

【００６０】まず、下側の吸着部材２$1_L$に熱風を供給して排気するために、流路切換器Ｖ１～Ｖ３の流路方向が、図６に実線で示したように設定される。その結果、流路Ｌ２を流通する清浄化空気の一部が分岐流路Ｌ３を介してヒータ２６に送られて加熱される。加熱された空気（熱風）は、流路切換器Ｖ１およびＶ２を介して下側の再生処理位置Ｐ2_Lに送られる。下側の吸着部材２$1_L$に熱風が流通することによって離脱された化学的汚染物質は、熱風に乗って流路Ｌ6_L、流路切換器Ｖ３、排気ファン２７、および排気経路２８を介して排気される。

【００６１】再生処理が終わると、流路切換器Ｖ１の流路方向だけが、図６に鎖線で示したように切り換えられる。その結果、分岐流路Ｌ３を流通する空気が流路切換器Ｖ１およびＶ２を介して下側の再生処理位置Ｐ2_Lに送られて、再生処理の終わった下側の吸着部材２$1_L$が強制的に冷却される。

【００６２】上側の吸着部材２$1_U$が適宜の期間にわたり継続して清浄化処理に使用されると、その清浄化性能が落ちる前に、下側の吸着部材２$1_L$と入れ換えを行う。具体的には、エアーシリンダ２９のロッド２９ａを伸張させることにより、下側の吸着部材２$1_L$を清浄化処理位置Ｐ１に、上側の吸着部材２$1_U$を上側の再生処理位置Ｐ2_Uに、それぞれ直線変位させる。その結果、清浄化処理位置Ｐ１では新たな（清浄化機能が再生された）下側の吸着部材２$1_U$を使って清浄化処理が継続して行われる。

【００６３】一方、上側の再生処理位置Ｐ2_Uで再生処理を行う場合は、流路切換器Ｖ１の流路方向を図６の実線で示す位置に、流路切換器Ｖ２の流路方向を図６の鎖線で示す位置に、流路切換器Ｖ３の流路方向を図６の鎖線で示す位置に、それぞれ切り換える。その結果、ヒータ２６から流路切換器Ｖ１およびＶ２を介して熱風が上側の再生処理位置Ｐ2_Uに送られて、上側の吸着部材２$1_U$が再生処理される。上側の吸着部材２$1_U$から離脱された化学的汚染物質は、鎖線位置に切り換えられた流路切換器Ｖ３および排気ファン２７などを介して排気される。再生処理が終わると、上述したと同様に、流路切換器Ｖ１の流路方向だけが切り換えられて、上側の再生処理位置Ｐ2_Uに冷却用空気が送られ、上側の吸着部材２$1_U$が強制冷却される。

【００６４】以上のように、本実施例の吸着除去装置２０では、上側の吸着部材２$1_U$で清浄化処理を行っているときは、下側の吸着部材２$1_L$の再生処理を行い、逆に下側の吸着部材２$1_L$で清浄化処理を行っているときは、上側の吸着部材２$1_U$の再生処理を行うというように、清浄化処理と再生処理とを同時並行して行っているので、図５で述べた吸着除去装置の場合と同様に、装置のランニングコストの低減を図ることができるとともに、装置の稼動効率を向上することができる。

【００６５】なお、本発明は上述した各実施例のものに限定されず、次のように変形実施することもできる。

（１）各実施例では、再生処理位置Ｐ２で吸着部材２１に熱風を送ることにより、吸着部材２１に吸着した化学的汚染物質を離脱させるようにしたが、吸着部材２１をヒータなどで直接に加熱することによって汚染物質を離

脱させてもよい。

【００６６】（２）本発明における吸着部材の再生処理は、加熱によるものに限らない。例えば、図５や図６中に示したヒータ２６に代えてオゾン発生器を設け、高濃度のオゾンを含む処理ガスを吸着部材に供給することにより、吸着部材の化学的汚染物質を分解して離脱させるようにしてもよい。

【００６７】（３）各実施例では、処理装置本体１０に塵埃除去フィルタ１２や化学吸着フィルタ１４を備えたが、これらのフィルタに代えて、あるいはこれらのフィルタとともに、活性炭フィルタを備えるようにしてもよい。

【００６８】（４）各実施例では、基板処理装置として基板にフォトレジストを塗布するスピンコータを例示したが、本発明はフォトレジストが塗布された基板を扱う種々の基板処理装置、例えば露光装置、現像装置、薬液処理装置などにも適用することができる。

【００６９】

【発明の効果】以上の説明から明らかなように、本発明によれば次の効果を奏する。請求項１に記載の発明によれば、非清浄空気中の化学的汚染物質を吸着除去装置で吸着除去して、清浄化空気を基板処理部へ供給する一方、この吸着除去装置から汚染物質を離脱させて排出しているので、吸着除去装置を長期間にわたって清浄化処理に供することができ、装置のランニングコストを低減することができる。

【００７０】請求項２に記載の発明によれば、清浄化処理位置で化学的汚染物質を吸着した吸着部材を再生処理位置に変位させて再生処理し、この吸着部材を再び清浄化処理位置に戻して清浄化処理に供するようにしているので、吸着部材を頻繁に交換する必要がなく、装置のランニングコストを低減することができる。

【００７１】請求項３および請求項４に記載の発明によれば、吸着部材の一部を使った清浄化処理と、吸着部材の他の部位の再生処理とを並行して行いながら、吸着部材を清浄化処理位置と再生処理位置との間で変位させているので、清浄化処理に供する吸着部材の入れ換えに待ち時間がなく、基板処理部へ清浄化空気を途切れることなく供給することができる。

【００７２】請求項５に記載の発明によれば、再生処理位置にある吸着部材を加熱して汚染物質を離脱させているので、吸着部材の再生処理を効率よく行うことができる。

【００７３】請求項６に記載の発明によれば、再生処理位置で加熱された吸着部材を冷却処理位置で強制的に冷却して清浄化処理位置に戻しているので、再生処理された吸着部材を自然冷却する場合のように冷却のために長時間待機させておく必要がない。つまり、再生処理された吸着部材を清浄化処理位置に短時間で戻すことができ、それだけ吸着部材の使用効率を高めることができる。

【００７４】請求項７に記載の発明によれば、吸着部材を通過した塵埃、あるいは吸着部材そのものから発生した塵埃は、基板処理部に至る前に塵埃除去フィルタによって捕捉除去されるので、基板処理部が塵埃によって汚染されることもない。

【００７５】請求項８に記載の発明によれば、非清浄空気中の化学的汚染物質の濃度が突発的に上昇しても、この汚染物質は再生可能な吸着部材と、化学吸着フィルタとの両方で除去されるので、周囲環境の突発的な異常によっても基板処理部が悪影響を受けることがない。

【００７６】請求項９に記載の発明によれば、吸着部材を通過した清浄化空気は、その温度および湿度が調整された後に基板処理部に供給されるので、基板処理部が周囲環境の温度および湿度の悪影響を受けることがない。

【００７７】請求項１０に記載の発明によれば、基板処理部を流通した空気を再利用する循環経路に再生可能な吸着部材を介在させているので、装置内部で発生した有機溶剤雰囲気が回収された空気中に含まれていても、その有機溶剤は吸着部材によって吸着除去される。また、吸着部材は再生処理位置に変位した際に再生されるので、有機溶剤の吸着によって吸着部材の交換頻度が増えるという不都合もない。

【００７８】請求項１１に記載の発明によれば、基板処理部を流通した空気の全てが回収されなくても、不足分の空気は外気取り込み経路を介して補充されるので、十分な量の清浄化空気を基板処理部に供給することができる。

【図面の簡単な説明】

【図１】本発明に係る基板処理装置の第１実施例の概略構成を示す図である。

【図２】第２実施例の概略構成を示す図である。

【図３】第３実施例の概略構成を示す図である。

【図４】第４実施例の概略構成を示す図である。

【図５】第１～第４実施例に用いられる吸着除去装置の概略構成を示す図である。

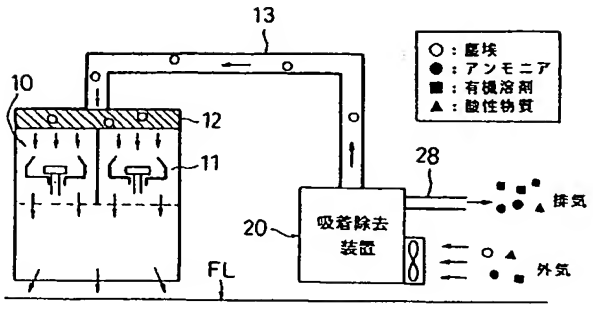
【図６】第５実施例に係る吸着除去装置の概略構成を示す図である。

【符号の説明】

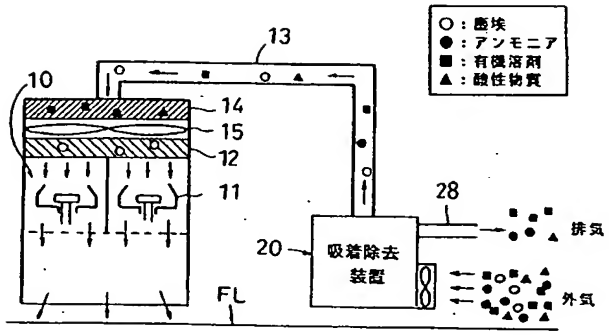
１０…処理装置本体
１１…基板処理部
１２…塵埃除去フィルタ
１３…清浄化空気流通経路
１４…化学吸着フィルタ
２０…吸着除去装置
２１…吸着部材
２２…モータ
２６…ヒータ
２８…排気経路
２９…エアーシリンダ

３０…温湿度コントローラ

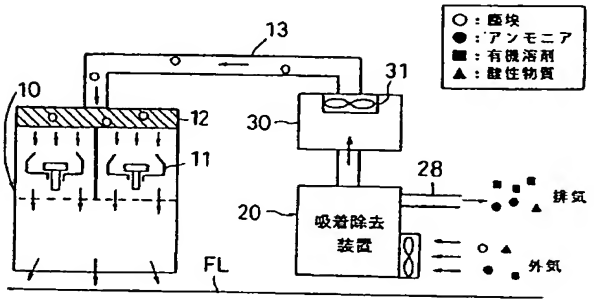
【図１】



【図２】



【図３】



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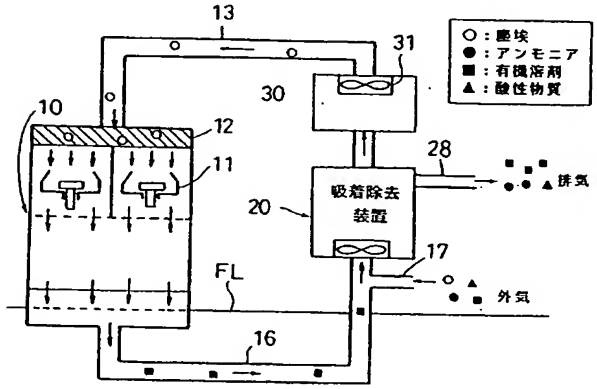

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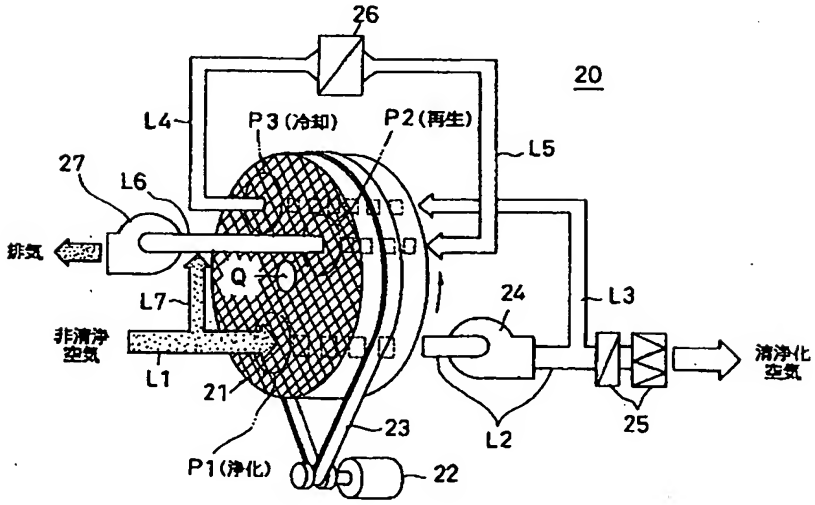

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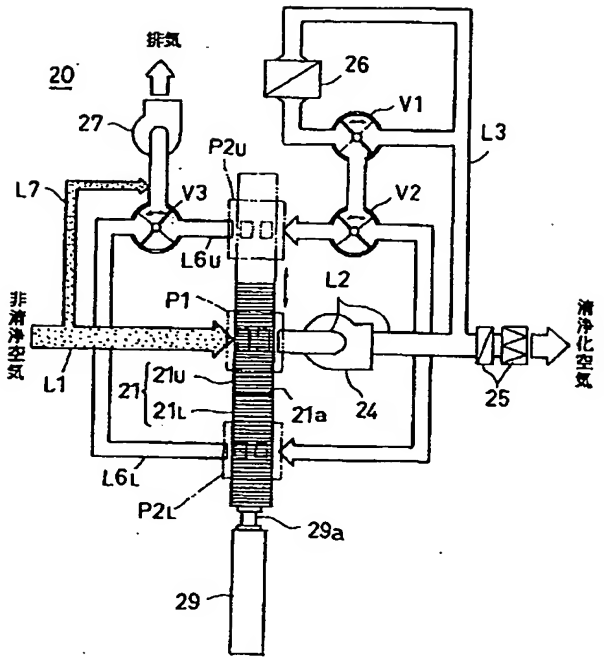

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